DOCUMENT RESUME

ED 422 866 IR 019 007

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TITLE Practice Makes Learning.
PUB DATE 1998-00-00
NOTE 8p.; In: Distance Learning '98. Proceedings of the Annual Conference on Distance Teaching & Learning (14th, Madison, WI, August 5-7, 1998); see IR 018 976.
PUB TYPE Reports - Descriptive (141) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Processes; *Distance Education; Educational Media; Educational Technology; *Instructional Design; Instructional Development; *Instructional Effectiveness; *Learning Strategies; Models; Teaching Methods

ABSTRACT

This paper focuses on how people learn to help educators design curriculum that will enable students to successfully complete a distance learning class. Up-front organization, clear communication about performance expectations, outcome driven assessment, and imaginative learning strategies are critical to successful distance learning. Differentiating between media and methods is the first step toward ensuring that learning and distance are not contradictory. Most learners learn better when they are actively engaged in the learning process; in distance learning it is even more important to abandon a "telling as teaching" mode for learning methods that support the human thinking and learning process. Our brains have three memory systems that deal with information processing and storage--sensory memory, working (short-term) memory, and long-term memory. Five main processes control the flow of information through the memory system--attention, encoding, rehearsal (practice), retrieval, and metacognition. The following five strategies will help to ensure that distance teaching also means distance learning: (1) provide learning plans; (2) design with a bias for learner-centered methods; (3) insert frequent practice; (4) support all stages of the learning cycle; and (5) vary the format of learning activities. (AEF)

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Practice Makes Learning

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In distance learning it is particularly tempting to become so engaged in figuring out how you can use the technology to deliver information to your learners that you neglect the front-end design of the *what*, *how* and *when* of the *learning*. Up-front organization, clear communication about performance expectations, outcome driven assessment, and imaginative learning strategies are even more critical to successful distance learning than they are in a classroom setting. When you and your learners are not physically in the same place at the same time, careful instructional design, based on what we know about how people learn, provides a map that guides you and your learners toward successful completion of a learning experience.

Methods and Media

Differentiating between media and methods is the first step toward ensuring that learning and distance are not contradictory. Instructional methods cause learning. Media deliver methods. Ruth Clark, Business and Industry Training Consultant, describes methods as "techniques that support cognitive processes that lead to learning." Examples of instructional methods include practice, simulation, discussion, presentation, demonstration, role play, questioning, debate, etc.

Dr. Clark goes on to define media as "delivery devices or strategies that carry methods." They do not cause learning in and of themselves. Examples of instructional media might include audio, video, computers, Internet—in the high tech arena. More traditional examples are transparencies, print materials, and even presenters, and instructors.

Studies show that though media and delivery format may affect accessibility and even satisfaction, given equivalent instructional methods, media do not impact the effectiveness of the instruction. When we design learning activities, we want to *first* concentrate on methods for helping learners learn. When we address the selection of distance learning media to deliver instruction, we may need to adapt some of our learning activities, but in doing so we need to be carefully creative to minimize any compromises that negatively impact the effectiveness of the learning.

Only after you have determined *what* your learners need to be able to do and how you will know *when* they have achieved the *what*, is it time to plan *how* your learners will get there. Though it is tempting at this point to focus on the delivery of content information, your learners' success depends on your resisting that temptation to first consider what methods (strategies that cause learning) you will build into the distance learning experience.

How Does the Learner's Mind Work?

Noted leader in adult education, Patricia Cross reminds us that "how learners are taught lies at the heart of quality education. It makes the difference between a lifelong learner and a

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grade grabber, between enthusiasm for learning and indifference to it, between an educated society and credentialed one." We know that most learners learn better when they are actively engaged in the learning process. In distance learning it is even more important to abandon a "telling as teaching" mode for learning methods that support the human thinking and learning process.

The Three Memories

Before you launch into the design of learning activities, you may find it helpful to consider how learning works within the learner's mind. In his book, *A Celebration of Neurons*, Robert Sylwester compares the organization of the memory system to the organization of an office. In the office we process vast amounts of information that compete for our attention. To cope, we label some information "junk mail" and discard it. We handle or process other information immediately and forget about it. Some information we store to be handled later; some we put into permanent files with related information; and other information we incorporate into new or existing procedures for operation.

Our brains have three memory systems that deal with information processing and storage: the sensory memory, the working (or short term) memory, and the long term memory. The sensory memory takes in enormous amounts of information. This memory system has a large capacity, but a very short duration (visual as little as .2 of a second; audio a maximum of 4 seconds). It selects a subset of the information that comes in (junking—ignoring the rest), transmitting the selected bits directly to the long term memory for storage or to the working memory for processing.

The working memory receives data taken in and selected by the sensory memory. The working memory then processes the selected information. It is our center of consciousness—our center of thinking. Though the working memory is very powerful in its ability to process information, it is also very fragile. Its capacity for quantity of information is limited to 5 to 9 chunks. Chunks are units of information that vary in size depending on the expertise of the individual. We know this as the rule of 7 +/-2.

The working memory also is limited in duration. Without rehearsal (practice), a chunk of information will last about 12 seconds. Thus the alternative label "short-term" memory. The working memory continually monitors the data being delivered by the sensory system, simultaneously prioritizing, editing, focusing, and shifting attention to important, interesting, and familiar information. It continually allows us to shift chunks of information between the foreground and background so that we can experience and respond to the current situation.

The third memory system is the long-term memory. It is considered permanent memory and serves as our repository for storing information. The long-term memory has immense capacity.

Five main processes control the flow of information through the memory systems: attention, encoding, rehearsal (practice), retrieval, and metacognition. Attention allows learners to select a sub-set of information that comes into the sensory memory for processing in the working memory. Encoding allows the learner to store information in any of the three memories. During rehearsal/practice the learner processes information in the working

memory. It is *only* through rehearsal/practice that learners can encode information to long-term memory. Since the information in working memory lasts only up to 12 seconds, learners do not learn anything until they have stored it in their long-term memories. *In other words, learners cannot learn without practice!*

In order to process information in our long-term memories, we need to retrieve it, bringing it to the working memory—our conscious mind. How many times have you seemingly "forgotten" a name that you are sure you know? You know the frustration—"It's just on the tip of my tongue." Actually, you have not "forgotten" the name; it is still in your long-term memory. Your problem is retrieval. In humans our working and long-term memories function together. As Robert Sylwester points out, "Short-term (working) memory allows us to experience the present, but we would become a prisoner of the present without the two interrelated forms of long-term memory."

The fifth process, metacognition, is not sequential, but functions as a monitoring system. The learner uses metacognitive process to set goals, select strategies, monitor progress, and adjust learning strategies.

Cognitive Overload

Cognitive overload is what learners sometimes refer to as "fried brain syndrome." It happens when the fragile working memory cannot process information in the quantities or at the speed with which it is being presented. Nothing is learned until learners encode it into long-term memory. Before entering the long-term memory, knowledge must be processed by the working memory; that is—practiced. Since the working memory can handle only so much material, a logical strategy for avoiding cognitive overload and maximizing its use is to clear out the clutter with meaningful practice that moves information from the working memory to the long-term memory.

Learning Styles/Processing Preferences

Research tells us that people learn in different ways. In distance learning environments it is easy to fall victim to a teaching-centered, rather than a learning-centered, approach. When we focus on teaching, we often try to mold all individuals into reflective, abstract, analytical, sequential learners. Moreover, teaching methods that focus heavily on giving information are easier to adapt to distance learning than are more learning-centered methods. In this teaching-centered environment the active, concrete, feeling, holistic learners struggle to adapt, but many of them just cannot succeed. They need to learn by *doing*.

Designing Effective Learning Methods

Surely distance learning is fertile ground for the application of numerous theories rooted in educational psychology and teaching methods. However, you may not have the luxury of returning for four to six credits of graduate work prior to designing your distance learning experience. As you plan your next distance learning course, these five strategies will help you move a long way toward ensuring that distance teaching also means distance *learning*:

- ❖ Provide learning plans
- ❖ Design with a bias for learner-centered methods
- ❖ Insert frequent practice

- ❖ Support all stages of the learning cycle
- ❖ Vary the format of learning activities

Provide Learning Plans

Metacognition is the learner's internal process for monitoring learning. Learners use metacognition to consciously apply study skills and to reflect on the process they have used to solve a problem. Learning plans lay out a road map for learning one competency or two-three related competencies by spelling out performance expectations—*what* learners will learn; explaining assessment—*when* you will know they have learned; and identifying learning activities and materials—giving learners a plan for *how* they can learn. A learning plan gives learners an advanced organizer that helps them consciously set goals, select strategies, regulate their progress, and adjust personal learning behavior. Though learning plans are very helpful in traditional, instructor-led learning environments, they are *critical* in distance learning situations where learners do not have frequent, in-person access to teachers.

Design With a Bias for Learner-Centered Methods

Learners learn best when they are actively engaged in the learning process. Though learning activities fall on a continuum somewhere between teacher-centered and learner-centered, the best measure is the level of passivity or involvement on the parts of the learners.

It is obvious that teacher-centered learning activities such as lecture and demonstration place the teacher in an active and directive role, and learner in a more passive role. What may not be as obvious, however, is that common distance learning activities such as reading teacher-selected texts and teacher-produced materials, viewing teacher-selected videos, and performing highly structured drill and practice are also predominately teacher-centered.

In learner-centered learning activities, teachers play a facilitation role, while learners play an active role. There are countless varieties of learner-centered learning activities such as role play, chat room discussions, interview, solving case studies, researching information—perhaps on the Internet, performance of a skill, reading learner-selected materials, developing learner-designed job or learning aids, and so forth.

Well-designed learner-centered activities cause critical and creative thinking. Because they involve learners, they also assist in the process of encoding learning into the long-term memory. Learner-centered activities hold learners' attention; support multiple learning styles or processing preferences; and provide metacognitive opportunities as learners are required to set goals and solve problems. Learner-centered activities make learners full partners in the learning process, teaching them how to learn, and requiring them to take responsibility for their own learning.

Insert Frequent Practice

Learning activities do two things—help learners acquire information or cause learners to practice. The simplest strategy for helping learners avoid cognitive overload is to chunk instruction into short, informative lessons that are punctuated by frequent, meaningful practice. When you provide feedback to practice, you do more than just clear the working

memory. You support metacognition by providing continuing improvement assessment that helps learners rate their learning success and helps instructors judge their teaching effectiveness when they can still make needed adjustments.

There are two types of practice—maintenance and elaborative rehearsal. Maintenance rehearsal involves repetition and memorization. It uses a great deal of energy, and may require as many as 500 repetitions before many learners can perform the skill or use the knowledge automatically. Though maintenance rehearsal serves to keep information active in the working memory, it also clutters this fragile, short-term memory. Consequently, it is not very efficient.

Elaborative rehearsal causes learners to interact with the content. This type of practice connects the new content or skill with what learners already know; applies practice to the solution of real problems; creates something new. Elaborative rehearsal is the more efficient way to encode information into long-term memory. Though examples of elaborative rehearsal are unlimited, we might include solving a case study problem, engaging in hands-on practice, examining how prior personal experience relates to the current content, creating a scenario that applies the new knowledge, taking and defending a position, synthesizing multiple ideas and perspectives, etc.

Support the Learning Cycle

When you develop learning activities for a competency or several related competencies, you are creating a plan that guides learners through the process of learning. We represent the learning process as a cycle (Figure 1). There are four major stages: motivation, comprehension, practice, and application. Each stage supports one or more of the five thinking processes: attention, encoding, rehearsal, retrieval, and metacognition. When you select the learning activities for a learning plan, choose activities that provide a framework guiding learners all the way through the cycle.

Figure 1

At the motivation stage you facilitate the attention process by inspiring learners to learn and answering the question "Why do I want to learn this information or skill?" During the

comprehension stage you facilitate encoding and processing in the working memory by clarifying performance expectations and helping learners access the information they need to perform the target competency. In the practice stage you need to provide guided practice—elaborative rehearsal, giving feedback to facilitate encoding to long term memory. Finally, at the application stage foster retrieval from the long term memory to enable working memory processing on demand. During the application stage learners need to show that they can apply what they have learned to real world problems and decision-making. It is during the application stage that you build in assessment.

When you design learning plans, move learners through the cycle: motivation, comprehension, practice, and application. However, learners need to swing back and forth between stages comprehension and practice before moving on to application. By doing this you help them avoid cognitive overload by chunking the learning into manageable pieces and punctuating it with frequent practice.

Vary the Format of Learning Activities

The way individuals learn depends on how they typically take in and process information. You can make your distance learning course friendly to differing learning styles and intelligences by varying the method (the learning strategy), media (the delivery mode), environment, interpersonal context, feedback, and givens.

You can choose from a limitless variety of learning methods by using various combinations of presentation, simulation, investigation, guided practice, projects, feedback, memory aids, graphic organizers, information seeking, information receiving, teacher-directed reading (textbooks or course materials), learner-directed reading, and so on. You can also vary the learning environment by creating learning activities that call for them to go into the community, centers for culture such as museum, or workplace.

You will enrich the variety by designing individual and collaborative learning activities that call for pairs, small or large groups. Even though distance learners may be learning via Internet, video, audio, etc., you can direct them to construct small groups on their own, or you can form discussion groups via E-mail, phone, or even snail mail.

Givens (what you provide for learners as prompts, information or tools) provide any number of options for varying learning and practice. You may provide a case study or a scenario as a prompt; you may give learners a particular problem to solve or topic to address. In guided practice you might provide a product or piece of equipment with flaws or errors that must be corrected. An even more effective variation is to have learners bring in or construct their own "givens," drawing on their experiences for relevant examples and problems.

Though one type of media may be dominant in your particular distance learning situation, you can reach a broader range of learners and learning styles by incorporating different types of media to deliver the instruction. If you have access to some of the newer technologies, you may use computer simulations, computer-based lessons, computer-based practice, satellite conferencing and even the Internet to deliver a portion of the learning.

Even in a "low tech" environment you can vary media with a rich combination of auditory learning (lecture, audio tape, radio), visual learning (transparencies, slides, flip charts, video, demonstration), and tactile learning (manipulatives, models, hands-on practice). You can vary delivery of information by giving learners access to guest speaker and panel presentations, and by filling differing roles as instructor (remember, you are media too) such as coach, facilitator, learner, presenter, questioner, etc.

Tools for Designing Learning

Educators and trainers in The Wisconsin Technical College Technical System, over 200 Wisconsin K–12 Schools, several University of Wisconsin Campuses and in schools and businesses in over 21 states and five foreign countries are using the WIDS Model and software to design learning-centered courses and workshops. WIDS offers a model, software, and a video course which work together to help teachers enhance the effectiveness of learning—at a distance or in person. The WIDS Software supports the design of learner-centered learning activities that are rich in practice. For more information about WIDS visit http://www.wtcsf.tec.wi.us/wids or call 1-800-821-6313.

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Autobiographical Sketch

Judy Neill, Director of Instructional Design and Planning for the Wisconsin Technical College System Foundation, Inc. serves as overall director for WIDS—The Wisconsin Instructional Design System. Judy has twenty-one years previous experience as Administrator of Instructional Development, instructional designer, distance learning supervisor, associate dean, adult education supervisor, and communication/social science teacher with Moraine Park Technical College in Fond du Lac, Wisconsin. She earned a M.S. Degree in Continuing Adult and Vocational Education from the University of Wisconsin—Madison and a B.A. Degree in Economics and Speech from Ripon College.

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